

## Northwest Portable Classroom Energy Study

Record numbers of students, demands for smaller class size, shrinking budgets, and growing infrastructure costs are spurring demand for portable classrooms in America's schools. 65% of schools in the West report using portable classrooms and 36% nationwide do so. Over 180,000 students attend school in about 6000 portables in the Northwest and districts' installations are increasing at a rate of 5% per year. Nationally, student enrollment is expected to grow throughout the century.

In the Northwest, Building America is funding state energy offices and Pacific Northwest National Laboratory to explore ways of making portable classrooms more efficient and better places in which to work and learn. As part of the Building America Industrialized Housing Partnership, the states and PNNL are using building science to examine energy consumption, lighting, and ventilation to make these classrooms more comfortable and better value investments.

Findings to date show that simple, low cost measures can do much to reduce energy costs and increase efficiency. The research team investigated existing classroom retrofits, side-by-side comparisons of energy-efficient and standard units available on the market, and classrooms built to special standards to increase efficiency.

Here are some of the project's key findings:

- T-8 lighting fixtures with electronic ballasts are cost effective in both new and existing buildings.
- Programmable thermostats only do half the job if they cannot be turned off for holidays. If they can be programmed for *automatic* holiday shutdown, all the better.
- Heating and ventilation controls that measure air pollutants or carbon dioxide are not effective.
- Additional high-efficiency and operable windows, located on opposite walls, provide needed daylighting and ventilation.



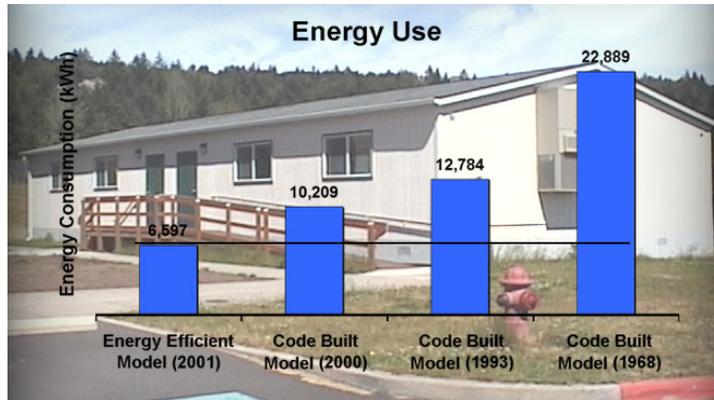
The Building America team used building science to analyze efficiency and comfort in portable classrooms.

- Air leakage through T-bar ceilings can lead to substantial energy loss and inefficient ventilation.
- Retrofitting energy saving measures to an existing classroom resulted in 31% energy savings.
- A new classroom built to enhanced standards above Oregon code resulted in 35% savings in comparison with a new unit built to existing code.
- A comparison of new “off-the-shelf” energy-efficient and standard portables found that building commissioning, independent verification of all building components, and proper operation are critical to proper building function. On-site commissioning should include air sealing of the marriage line and other leaks, HVAC system and controls, ventilation air flows, and proper thermostat programming.

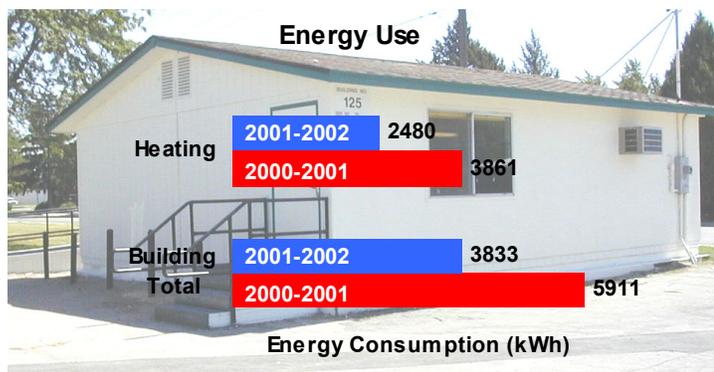
Future project work will include developing specifications for the purchase, construction, set up, and operation of portable classrooms; preparing recommendations for low-emitting paints, furniture, and flooring; and building an advanced design portable classroom that incorporates special roof sealing, natural daylighting, and renewable resources.

To learn more, contact:  
 The Building America website at [www.eren.doe.gov/buildings/building\\_america](http://www.eren.doe.gov/buildings/building_america)  
 The Building America Industrialized Housing Partnership at [www.baihp.org](http://www.baihp.org)  
 Washington State University Energy Program at [www.energy.wsu.edu](http://www.energy.wsu.edu)  
 Oregon Office of Energy at [www.cbs.state.or.us/external/ooe](http://www.cbs.state.or.us/external/ooe)  
 Idaho Department of Water Resources at [www.idwr.state.id.us](http://www.idwr.state.id.us)  
 Pacific Northwest National Laboratory at [www.buildingamerica.pnl.gov](http://www.buildingamerica.pnl.gov)  
 Energy monitoring data is available at [www.infomonitors.com](http://www.infomonitors.com)

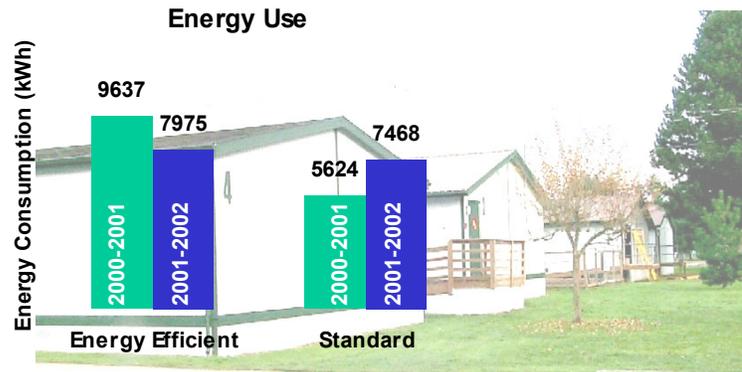
## Energy Use Comparisons



Oregon enhanced standards compared to typical code



Idaho before and after retrofit



Washington Classroom Comparison

